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Mindfulness and Psychological Adjustment in Paediatric Obesity: The Mediating Role of Body Image

Mindfulness e Ajustamento Psicológico na Obesidade Pediátrica: O Papel Mediador da Imagem Corporal

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Abstract

Aim: The present study explored the potential mediating role of body dissatisfaction and body shame in the relationship between dispositional mindfulness and psychological adjustment in children/adolescents with overweight/obesity. The study aimed to explore the moderating role of gender in the proposed associations.
Method: The sample comprised 105 children/adolescents with overweight/obesity who completed self-report instruments, including the Mindfulness Measure for Children and Adolescents (CAMM), the Collins Body Image Scale (CBI), the body shame subscale of the Experience of Shame Scale (ESS), the Strengths and Difficulties Questionnaire (SDQ) and the DISABKIDS-37.
Results: Regardless of gender, body shame mediated the association between mindfulness and mental and social quality of life (QoL) and the association between mindfulness and internalising problems.
Conclusion: These results suggest that psychological interventions focused on developing mindfulness skills and reducing body shame may be particularly useful for promoting the psychological adjustment of children/adolescents with overweight/obesity.

Keywords: paediatric obesity, dispositional mindfulness, body dissatisfaction, body shame, psychological adjustment

Resumo

Objetivo: Este estudo explorou o papel mediador da insatisfação e vergonha corporais na relação entre o mindfulness e a adaptação psicológica de crianças/adolescentes com excesso de peso/obesidade. Pretendeu ainda testar o papel moderador do género das crianças/adolescentes no modelo investigado.
Método: A amostra incluiu 105 crianças/adolescentes com excesso de peso/obesidade, que completaram instrumentos de autorrelato incluindo a Medida de Mindfulness para Crianças e Adolescentes (CAMM), a Escala de Silhuetas de Collins (CBI), a subescala de vergonha corporal da Escala de Experiência de Vergonha (EES), o Questionário de Capacidades e Dificuldades (SDQ) e o DISABKIDS-37.
Resultados: Independentemente do género, a vergonha corporal mediou a associação entre o mindfulness e a qualidade de vida (QdV) mental e social, e entre o mindfulness e os problemas internalizantes.
Conclusão: Estes resultados sugerem que as intervenções psicológicas focadas no desenvolvimento das capacidades de mindfulness e na diminuição da vergonha corporal poderão ser particularmente úteis na promoção da adaptação psicológica das crianças/adolescentes com excesso de peso/obesidade.

Palavras-Chave: obesidade pediátrica, mindfulness disposicional, insatisfação corporal, vergonha corporal, adaptação psicológica

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Paediatric obesity is one of the most serious public health challenges of the 21st century (Sahoo et al., 2015). According to the World Health Organization (WHO, 2012), Portugal is among the countries with the highest prevalence of paediatric overweight/obesity. For instance, a study recently conducted in Portugal reports that 31.6% of children attending elementary school are overweight, and 13.9% have obesity (Rito & Graça, 2015).

Some studies have found that overweight/obesity may compromise the emotional and social well-being of children/adolescents (Chung, Chiou, & Chen, 2015; Jelalian & Hart, 2009; Junior, Cavazzotto, Paludo, Zambrin, & Simões, 2015; Sahoo et al., 2015) and is associated with a worse quality of life (QoL) (Gouveia, 2013; Gouveia, Frontini, Canavarro, & Moreira, 2014; Ottova, Erhart, Rajmil, Dettenborn-Betz, & Ravens-Sieberer, 2012) and an increase in internalising (e.g., depression, anxiety; Goodman & Whitaker, 2002; Gouveia, 2013; Sjöberg, Nilsson, & Leppert, 2005; Zeller & Modi, 2008) and externalising problems (e.g., impulsivity, attention-deficit hyperactivity disorder; Gouveia et al., 2014). These problems may arise because of the stigmatisation and victimisation children/adolescents with overweight/obesity suffer (Latner & Stunkard, 2003) and the strong social pressure to be thin/muscular (Neumark-Sztainer, 2011).

However, there is empirical evidence that these youths are not systematically at risk of major psychological suffering and that their psychological adjustment may vary according to different factors, such as body dissatisfaction (Jelalian & Hart, 2009).

Body Image in Paediatric Overweight/Obesity

Concerns about body image begin early in childhood (Smolak, 2011, 2012), and may impact the self, as well as the children's mental health and social functioning. In elementary school, children engage in social comparison, which significantly increases during adolescence (Smolak, 2012). According to Smolak (2012), social comparison to peers and the media, and direct comments from parents and peers likely transform beliefs and stereotypes about attractiveness into self-evaluations concerning appearance. The same author explains that the "beauty is good" stereotype emerges during infancy and is refined and expanded throughout the preschool years. When youths do not achieve socially established beauty standards, negative self-image and depressive symptoms might result (Smolak, 2012). Additionally, a negative self-image during infancy may be a risk factor for the later development of psychopathologies (Neves, Cipriani, Meireles, Morgado, & Ferreira, 2017), such as disturbed eating (Tiggemann, 2006).

In fact, children/adolescents with overweight/obesity usually report higher levels of body dissatisfaction than their normal-weight peers (Pinquart, 2013). A few studies have shown that body dissatisfaction mediates the relationship between overweight/obesity and the psychological adjustment of children/adolescents (e.g., emotional well-being, Gall et al., 2016; self-esteem, Shin & Shin, 2008). For instance, a study of children between 10 and 12 years old with obesity revealed that higher levels of body dissatisfaction mediated the association between weight and self-esteem. Specifically, the greater the body dissatisfaction, the higher the vulnerability to developing psychological problems (Shin & Shin, 2008).

Body shame, a self-conscious emotion that arises when individuals perceive their body shape and physical appearance as inferior to the socially accepted body size and shape (Gilbert, 2002), may also work as a mediator variable in the association between weight and psychological adjustment. For example, it has been reported

that among adults with higher weights, greater levels of body shame were associated with lower self-esteem (Pila, Sabiston, Brunet, Castonguay, & O'Loughlin, 2015) and higher levels of body dissatisfaction (Silva, 2013).

The investigation of body shame among children/adolescents is increasing in different contexts, such as bullying (e.g., Duarte & Pinto-Gouveia, 2017; Duarte, Pinto-Gouveia, & Stubbs, 2017), sexual abuse and bulimia (Andrews, 1997), body objectification (Grabe, Hyde, & Lindberg, 2007; Lindberg, Hyde, & McKinley, 2006), and eating psychopathology (Silva, 2013). For example, Silva (2013) found that body dissatisfaction was positively and moderately correlated with body shame in a community sample of normal-weight youth. Another study with a sample of obese youth and a sample of normal-weight youth between 13 and 19 years old showed that, in both groups, body shame was positively associated with dysfunctional eating behaviour, mediating the relationship between low self-esteem and the risk of developing eating disorders (Iannaccone, D'Olimpio, Cella, & Cotrufo, 2016). Recently, in the context of paediatric obesity, Moreira and Canavarro (2017) found that higher levels of mindfulness were associated with a better perceived QoL through lower levels of body shame, but only for girls.

Considering that children/adolescents with overweight/obesity have a higher risk of presenting poor psychological adjustment (e.g., Chung, Chiou, & Chen, 2015; Jelalian & Hart, 2009) and higher levels of body dissatisfaction (Gall et al., 2016) and body shame (Moreira & Canavarro, 2017) than children with normal weight, it is crucial to identify the factors that may promote better psychological adjustment and lower levels of body dissatisfaction and body shame.

Mindfulness and its Role in the Psychological Adjustment of Children/Adolescents with Overweight/Obesity

As Kabat-Zinn (1994, p. 4) defined it, mindfulness is "the ability to pay attention in a particular way: intentionally, at the present moment and without judgment". Accordingly, dispositional mindfulness is an inherent characteristic that corresponds to an individual's ability to attend to and to be aware of what is occurring in the present moment (Brown & Ryan, 2003). According to Bishop et al. (2004), this ability to pay attention to the present moment is characterised by curiosity and an opening and accepting stance.

Dispositional mindfulness has been associated with positive outcomes in children/adolescents. For instance, it has been positively correlated with QoL and academic and social skills and negatively correlated with somatic complaints, internalising and externalising symptoms (Greco, Baer, & Smith, 2011), rumination, self-culpabilisation and catastrophisation (Bruin, Zijlstra, & Bögels, 2014). According to Wilson (2004), the mindful experiencing of shape and weight, which promotes self-acceptance and attenuates maladaptive rumination, offers a way out of this cycle of negative self-evaluation.

Although there are only a few studies focusing on the relationship between mindfulness and body image in children/adolescents with overweight/obesity (Moreira & Canavarro, 2017), previous studies with adults have shown that mindfulness may reduce body dissatisfaction in both genders (Dekeyser, Raes, Leijssen, Leysen, & Dewulf, 2008; Dijkstra & Barelds, 2011; Lavender, Gratz, & Anderson, 2012; Pidgeon & Appleby, 2014). The relationship between mindfulness and body (dis)satisfaction might arise from the fact that body dissatisfaction is associated with rigid, negative automatic thoughts about body shape and weight and with different methods of behavioural avoidance (Lavender, Gratz, & Anderson, 2012). Since mindfulness contributes to fewer rigid

thinking patterns and less-negative automatic thoughts and emotions, it might also result in lower levels of body dissatisfaction (Fink, Foran, Sweeney, & O'Hea, 2009; Stewart, 2004). To the best of our knowledge, no studies have explored this relationship in both children and adolescents with overweight/obesity.

Because mindfulness is an adaptive emotional regulation strategy (Chambers, Gullone, & Allen, 2009) related to several positive psychological adjustment outcomes in children and adolescents (Greco, Baer, & Smith, 2011), we aimed to investigate whether it was also associated with body dissatisfaction and body shame, as well as with the psychological adjustment of children/adolescents with overweight/obesity.

The Present Study

This study aimed to examine the mediating role of body dissatisfaction and body shame in the relationship between mindfulness and psychological adjustment in children/adolescents with overweight/obesity. In the present study, "psychological adjustment" was operationalised through "quality of life" and "internalising and externalising problems" to evaluate the psychological functioning of these children/adolescents through a "positive" measure (quality of life), and a negative one (internalising/externalising problems).

We expected that higher levels of mindfulness would be associated with lower levels of body dissatisfaction (as was shown in adult population, Pidgeon & Appleby, 2014) and lower levels of body shame (because body dissatisfaction and body shame appear associated, Silva, 2013). We also hypothesised that lower levels of body shame and body dissatisfaction would, in turn, be associated with a better QoL (mental and social) and with lower levels of internalising and externalising problems, given that mindfulness is associated with positive outcomes in children/adolescents (Greco, Baer, & Smith, 2011). Because girls have a higher prevalence of appearance concerns than boys and since those concerns tend to have a major impact on girls' psychological adjustment (Wertheim, Paxton, & Blaney, 2009), the current study also intended to test the moderating role of gender in the mediation model. Because this is a novel model, no hypotheses were established for this moderating effect.

Methods

Participants

The present study comprised a sample of 45 children (42.9%; 7-12 years old) and 60 adolescents (57.1%; 13-18 years old) who had either overweight (n = 31, 29.5%) or obesity (n = 71, 67.6%) and had a mean standardised body mass index (BMI) of 1.81 (SD = 0.41, range = 0.98-2.76). The children/adolescents had an average age of 13.19 years (SD = 2.72) and were mostly girls (n = 65, 61.9%). Though the majority of the children/adolescents had no comorbid health problems (n = 90, 85.7%), approximately 14.3% (n = 15) had some comorbid condition, such as asthma or diabetes. The following inclusion criteria were considered: (1) age between 7 and 18 years; (2) BMI between the 85th and 95th percentile (overweight) or above the 95th percentile (obesity), according to the Centers for Disease Control and Prevention (CDC; Kuczmarski et al., 2002) growth curves, which have been used by the Portuguese Health System since 2006; (3) the ability to understand and answer the questionnaires, as evaluated by a clinical psychologist; (4) the absence of mental illness or developmental delay; and (5) the absence of genetic syndromes characterised by overweight/obesity.

Procedure

The sample was collected from the paediatric ambulatory nutrition outpatient services of one Portuguese urban public hospital and one health care centre. The study was approved by the Ethics Committee for Health and the Board of Directors of these institutions, the Regional Health Administration, and the National Committee for Data Protection. After the nutrition consultation, a research assistant explained the study to the children/adolescents and their parents, and requested their participation. Those who agreed to participate provided written informed consent before the assessment protocol was applied. When the participants were not available to complete the protocol at the health institution, a sealed envelope was provided for them to complete the protocol at home and return it later by post.

Measures

Mindfulness

The Mindfulness Measure for Children and Adolescents (CAMM; Cunha, Galhardo, & Pinto-Gouveia, 2013; Greco, Baer, & Smith, 2011) contains 10 items (e.g., "I get upset with myself for having feelings that don't make sense"). This questionnaire was developed to assess mindfulness skills in children/adolescents between 9 and 18 years old. The participants answered using a five-point Likert-type response scale, ranging from 0 (*never*) to 4 (*always*). The total score, which is the result of all summed items, varies between 0 and 40 points, with higher scores indicating higher levels of mindfulness skills. In the present study, the Cronbach's alpha was .81.

Body Dissatisfaction

The Collins Body Image scale (CBI; Collins, 1991; Simões, 2014) aims to evaluate body (dis)satisfaction in children/adolescents aged 8 to 18 years. It is a pictorial questionnaire comprising a set of seven female and male silhouettes that illustrates body weights ranging from less volume (1 - *very thin*) to more volume (7 - *obese*). Each participant was asked to indicate the figure that looks the most like him/herself ("real" body image) and the figure that shows the way he/she would like to look ("ideal" body image). The difference between the "real" and the "ideal" body image was used as a measure of body dissatisfaction. Negative scores indicate the desire to gain weight, and positive scores indicate the desire to lose weight.

Body Shame

The body shame subscale of The Experience of Shame Scale (ESS; Andrews, Qian, & Valentine, 2002; Rodrigues, 2013) contains four items (e.g., "Have you felt ashamed of your body or any part of it?") answered on a four-point Likert-type scale ranging from 1 (*not at all*) to 4 (*very much*). Although the instrument was developed for the adult population, the Portuguese version was validated in an adolescent sample aged between 14 and 18 years (Rodrigues, 2013). The total score ranges between 4 and 16 points and is obtained by summing the scores of all the items. Higher scores indicate higher levels of body shame. In the present sample, the Cronbach's alpha was .87.

Internalising and Externalising Problems

The Strengths and Difficulties Questionnaire (SDQ; Fleitlich, Loureiro, Fonseca, & Gaspar, 2005; Goodman, 2001) was used to evaluate internalising and externalising problems. Following the most recent recommendations (Goodman, Lamping, & Ploubidis, 2010), the emotional problems and peer problems subscales were combined into the internalising problems subscale (10 items; e.g., "I am often unhappy, down-hearted or tear-

ful"), and the behavioural problems and hyperactivity behaviour subscales were combined into the externalising problems subscale (10 items; e.g., "I take things that are not mine from home, school or elsewhere"). The questionnaire was answered on a three-point Likert-type scale ranging from 0 (*not true*) to 2 (*completely true*). Each subscale total score, which is the sum of the items, ranges between 0 and 20 points. Higher scores reflect higher levels of internalising/externalising problems. In the present study, the Cronbach's alphas were .69 (internalising problems) and .70 (externalising problems).

Mental and Social Quality of Life

The DISABKIDS-37 (*DISABKIDS Chronic Generic Module*; Carona, Bullinger, & Canavarro, 2011; The DISABKIDS Group Europe, 2006). generic model assesses the health-related QoL of children/adolescents between 8 and 18 years of age with a chronic health condition. This questionnaire is divided into six dimensions that corresponding to three domains: emotions and independence (mental domain), social inclusion and social exclusion (social domain), and physical limitations and medication (physical domain). In the present study, only the mental and social domains were considered. This instrument includes 37 items (e.g., "Do you enjoy your life?") answered on a five-point Likert-type scale that ranges between 1 (*never*) and 5 (*always*). In this study, standardised scores were used (0-100), with higher levels indicating a better QoL. In this sample, the Cronbach's alphas were .88 (mental domain) and .82 (social domain).

Data Analysis

Statistical analysis was performed with the IBM SPSS statistic program (22.0 version) and the macro PROCESS for SPSS (Hayes, 2013). A power analysis (G*Power) showed that the sample size met the requirements for bivariate correlations, with a power of .80. In addition, the empirical power tables proposed by Fritz and MacKinnon (2007) for mediation models suggest that the sample size of this study was sufficient to find a mediated effect, including small-to-medium and medium *a* and *b* paths, with a power of .80.

Descriptive statistics and Pearson's correlations were computed for all the study variables. A moderated mediation analysis was performed to test whether the indirect effect of dispositional mindfulness (independent variable [IV]) on internalising and externalising problems and the social and mental QoL (dependent variables [DV]) through body dissatisfaction and body shame (mediator variables) were moderated by the children/adolescents' gender. Prior to these analyses, correlations between study and socio-demographic variables (age, comorbidity and zBMI) were tested to identify potential covariates to be included in the model. In the moderated mediation model (model 14; Hayes, 2013), the mediators were hypothesised to affect the path between the mediator variables and the DVs (path b). Following Hayes' recommendations (2013), in the absence of a significant interaction, the mediator was removed and a simple mediation model was estimated (model 4; Hayes, 2013). The indirect effects were tested using a bootstrapping procedure (10000 samples), which generated 95% bias-corrected and accelerated confidence intervals (BCaCIs). The indirect effect was considered significant if confidence interval [CI] did not contain zero.

Table 1

Descriptive Statistics and Correlations Among Study Variables (N = 105)

Variable	*M*(*SD*)							
	Boys (*n* = 40)	Girls (*n* = 65)	1	2	3	4	5	6
1. Dispositional mindfulness	27.23 (7.16)	26.55 (7.63)	–					
2. Body shame	1.73 (0.73)	1.97 (0.81)	-.52**	–				
3. Body dissatisfaction	1.69 (0.81)	1.62 (0.94)	-.20**	.20*	–			
4. Internalising problems	5.33 (3.14)	6.02 (3.15)	-.62**	.45**	.15	–		
5. Externalising problems	6.18 (3.11)	5.82 (3.28)	-.18	.08	.13	.21*	–	
6. Mental QoL	75.14 (18.66)	73.31 (17.90)	.44**	-.51**	-.33**	-.49**	-.32**	–
7. Social QoL	79.84 (17.33)	79.71 (13.74)	.32**	-.37**	-.23*	-.50**	-.36**	.68**

*p < .05. **p < .01.

Results

Descriptive Statistics and Correlations

The descriptive statistics and correlations of the study variables are shown in Table 1. All the correlations were statistically significant except for the correlation between externalising problems and mindfulness and the correlation between body shame and body dissatisfaction.

The Indirect Effect of Mindfulness on Internalising and Externalising Problems and Mental and Social QoL through Body Shame and Body Dissatisfaction

Preliminary Analyses

Before the moderated mediation analysis was conducted, bivariate correlations between DVs and socio-demographic variables (age, comorbidities and zBMI) were tested. Only the internalising problems were significantly correlated with age (r = -.22, p < .05). Therefore, age was included as a covariate in the internalising problems model.

Moderated Mediation Analyses

Since externalising problems were not significantly correlated with mindfulness, body shame or body dissatisfaction (see Table 1), the moderated mediation analysis was not performed. In the internalising problems model, only body shame was considered as a mediator since the correlation between body dissatisfaction and internalising problems was not statistically significant.

The moderated mediation analysis revealed that gender was not a significant moderator in any of the tested models. Specifically, in the mental QoL model, neither the interaction between gender and body shame (b = -2.37, SE = 4.11, p = .566) nor the interaction between gender and body dissatisfaction (b = 1.20, SE = 3.69, p = .589) were significant. In the social QoL model, the interactions between gender and body shame (b = 1.08, SE = 3.80, p = .778) and between gender and body dissatisfaction (b = 5.00, SE = 3.41, p = .145) were also statistically nonsignificant. Finally, in the internalising problems model, the interaction be-

tween gender and body shame were equally nonsignificant (b = -0.32, SE = 0.66, p = .633). Therefore, simple mediation models were analysed.

Simple Mediation Analyses

In all the models, mindfulness was significantly associated with body shame, explaining 26.78% of its variance, $F(1, 103) = 37.68$, $p < .001$. In the mental and social QoL models, mindfulness was significantly associated with body dissatisfaction, explaining 4.1% of its variance, $F(1, 103) = 4.40$, $p = .038$.

As shown in Figure 1, mindfulness, body shame and body dissatisfaction explained 34.48% of the mental QoL variance, $F(3, 101) = 17.72$, $p < .001$. Mindfulness was significantly associated with mental QoL, and the total and direct effects were equally significant. Body shame and body dissatisfaction were significantly and negatively associated with mental QoL. Mindfulness was indirectly associated with mental QoL through body shame (point estimate = 0.46, SE = 0.14, 95% BCaCI [0.214, 0.755]) but not through body dissatisfaction (point estimate = 0.10, SE = 0.09, 95% BCaCI [-0.005, 0.360]).

In the social QoL model, mindfulness, body shame and body dissatisfaction explained 17.97% of the social QoL variance, $F(3, 101) = 7.37$, $p < .001$. Mindfulness exhibited a significant total effect but a nonsignificant direct effect on social QoL. Body shame was significantly and negatively associated with social QoL, in contrast to body dissatisfaction. The indirect effect of mindfulness on social QoL through body shame was significant (point estimate = 0.27, SE = 0.12, 95% BCaCI [0.066, 0.559]), but the indirect effect through body dissatisfaction was not (point estimate = 0.06, SE = 0.06, 95% BCaCI [-0.011, 0.272]).

Finally, mindfulness and body shame explained 47.76% of the variance in internalising problems, $F(3, 101) = 30.78$, $p < .001$. Mindfulness presented a significant total and direct effect on internalising symptoms, and body shame was also significantly and positively associated with internalising problems. The indirect effect of mindfulness on internalising problems through body shame was significant (point estimate = -0.05, SE = 0.02, 95% BCaCI [-0.095, -0.013]).

Discussion

The present study partially corroborated the initial hypotheses because only body shame was a significant mediator of the association between mindfulness and psychological adjustment (mental and social QoL and internalising problems). Body dissatisfaction was not a significant mediator of this association. These results suggest that the association between mindfulness and psychological adjustment in these children/adolescents is not explained by an evaluative component of body image (i.e., body dissatisfaction) but by an emotional component (i.e., body shame) (Cash, 2002).

To the best of our knowledge, this is the first study examining the association between mindfulness and different components of body image in paediatric overweight/obesity. In the present study, mindfulness was negatively and significantly associated with body shame. A plausible reason for this association could be that mindfulness involves an attitude of acceptance and non-judgment of internal and external experiences in the present moment (Bishop et al., 2004); therefore, children/adolescents with higher levels of mindfulness might be able to accept their body shape and weight instead of judging their appearance negatively when comparing themselves with certain beauty standards (i.e., expectations about appearance conveyed by the society, Cash,

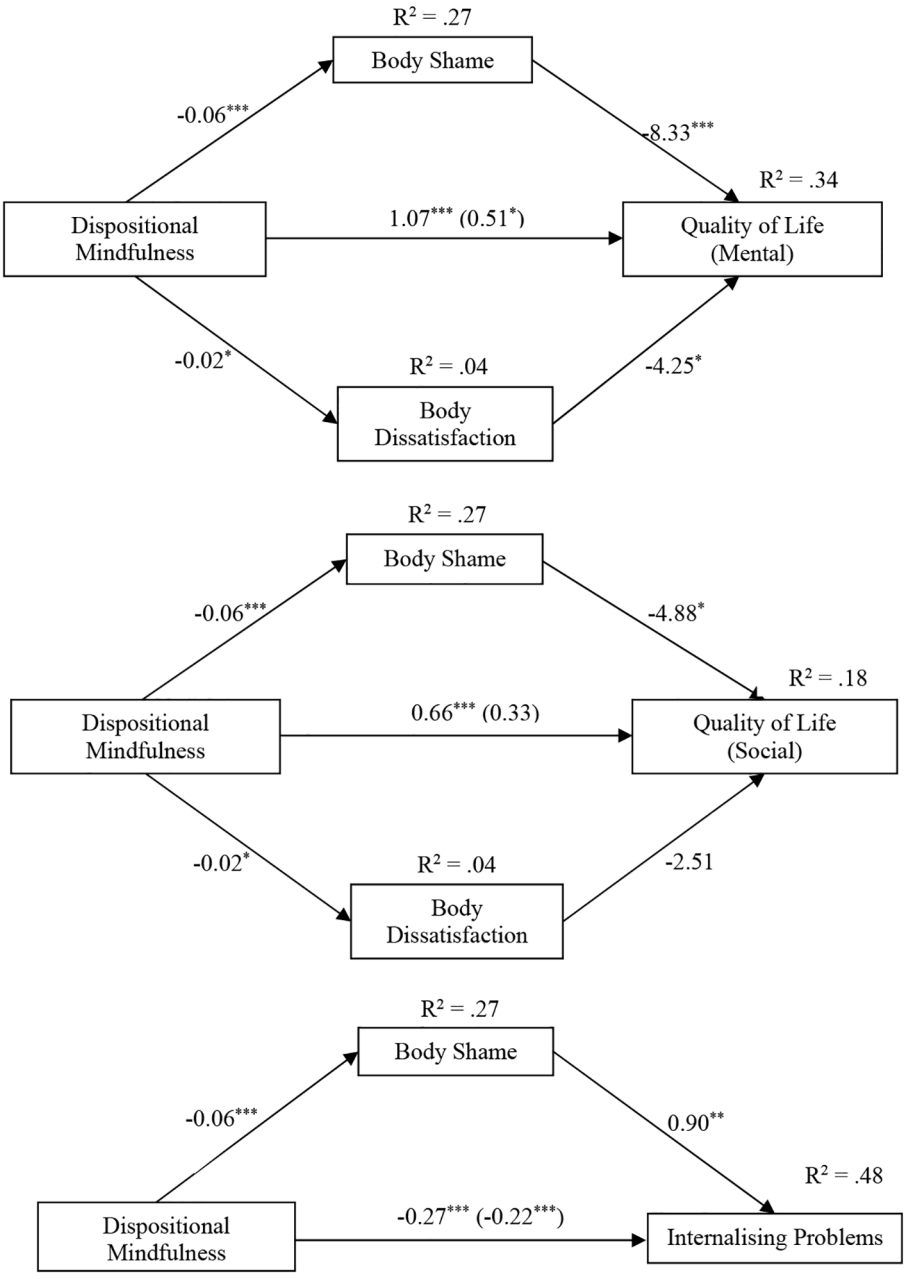

Figure 1. Statistical diagrams of the simple mediating models of the indirect effect between dispositional mindfulness and mental and social QoL through body shame and body dissatisfaction and those of the indirect effect between dispositional mindfulness and internalising problems through body shame.

*p < .05. **p < .01. ***p < .001.

2002). Furthermore, they might have a greater capacity to direct their attentional resources to present experiences (Woods & Proeve, 2014) instead of focusing on self-evaluative, self-conscious (Leary, Adams, & Tate, 2006), ruminative (Cheung, Gilbert, & Irons, 2004) and self-critical thoughts (Andrews, 1998) characteristics of shame, thus experiencing lower levels of shame. Therefore, mindfulness skills might help children/adolescents with overweight/obesity to decentre from their internal experiences and see them as transient events instead of

self-defining features. This study thus suggests that a more adaptive method of emotional regulation, such as mindfulness skills, might lead to a reduced experience of body shame and, consequently, to better levels of psychological adjustment, with the exception of externalising problems.

Regarding the association between body dissatisfaction and body shame and the psychological adjustment of children/adolescents with overweight/obesity, our findings are in line with previous studies that have already suggested the important impact of body image on children/adolescents' psychological functioning (Goldfield et al., 2010; Loth, Mond, Wall, & Neumark-Sztainer, 2011; Shin & Shin, 2008). Given the ideals established by Western societies — where thinness is usually associated with joy, success, youth and social acceptance, while overweight is associated with a lack of willpower and loss of control (Grogan, 2007) — children/adolescents with overweight/obesity are easily stigmatised (Puhl & Brownell, 2003) and face systematic discrimination throughout their development (Fonseca, 2008). Thus, it is not surprising that greater body dissatisfaction and body shame are associated with worse psychological functioning, especially in these youths (Goldfield et al., 2010; Loth, Mond, Wall, & Neumark-Sztainer, 2011; Shin & Shin, 2008; Silva, 2013).

In addition to the indirect effect of mindfulness on the adjustment variables, a significant direct effect of mindfulness on mental QoL and on internalising problems was also found. This means that mindfulness, as an adaptive emotional regulation process, is likely to promote better psychological adjustment, regardless of its relationship with body shame or body dissatisfaction. These results are sustained by other studies, which consistently found a positive association between mindfulness and diverse positive psychological outcomes (Brown & Ryan, 2003; Greco, Baer, & Smith, 2011).

Contrary to expectations, no significant associations were found between mindfulness, the mediator variables and the externalising problems. Further investigation is needed to replicate these analyses in a larger sample and using a different assessment instrument that includes externalising dimensions other than those assessed in this study. It would also be important to further explore other relevant psychological variables, such as self-compassion, parental psychopathology or cognitive flexibility that could contribute to lower levels of externalising problems among children/adolescents with obesity.

Regarding the moderating role of gender, we found that the association between mindfulness and psychological adjustment through body shame and body dissatisfaction was independent of the children/adolescents' gender. This seems to suggest that among children and adolescents with overweight/obesity, body image is equally relevant and valued for both boys and girls. Although body image concerns are usually more prevalent among girls and tend to have a greater impact on their psychosocial adjustment (Grabe, Hyde, & Lindberg, 2007), when children/adolescents have overweight/obesity, the stigmatisation risk (Puhl & Brownell, 2003) and systematic discrimination (Fonseca, 2008) are felt by both girls and boys; therefore, the risk of feeling dissatisfied with their body and showing higher levels of body shame may be similar for both sexes. Therefore, it is understandable that body dissatisfaction and body shame have the same impact on both psychological adjustment and mindfulness in both boys and girls.

Limitations, Strengths and Clinical Implications

First, the cross-sectional design of this study prevents conclusions concerning casual relations between variables. Second, the sample was not randomised, thus, it does not guarantee that the results were explained by the study variables and not by other dispositional variables or by chance. Third, the representativeness of the

sample might be questioned as the sample was collected from only one paediatric hospital and one health centre in the central region of Portugal, and all the children/adolescents were attending nutrition appointments. Therefore, our results may not be generalised to children and adolescents from other regions and those who are not in obesity treatment. Fourth, different methods were used in the sample collection procedure; some individuals completed the questionnaire in the presence of a research assistant, while others completed the questionnaires at home. Fifth, it is important to note that 61.9% of the sample were females, which might have influenced the results. Sixth, the alpha value of the internalising problems' scale was at the acceptable limit. Finally, although the sample size was sufficient to detect moderate and large effects in the analyses, ideally, future studies should include a larger sample that allows the detection of small effects and the separate analysis of overweight and obese children/adolescents.

Despite these limitations, this study has important clinical implications. First, it highlights the need for prevention and early psychological intervention with overweight/obese children/adolescents. It is important for these youths to be treated in a multidisciplinary professional group. Second, our results suggest that the modifying mechanism underlying these youths' psychological adjustment, specifically body shame, should be a central topic in psychological interventions, which should include specific techniques for developing adaptive emotional regulation strategies. Therapeutic strategies might, therefore, have a focus on the development of mindfulness skills through mindfulness-based intervention programs, which may diminish the levels of body shame and, consequently, promote better psychological adjustment in children/adolescents with overweight/obesity.

Competing Interests

The authors declare that they have no conflict of interests.

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Informed Consent

Informed consent was obtained from all the individual participants included in the study.

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